

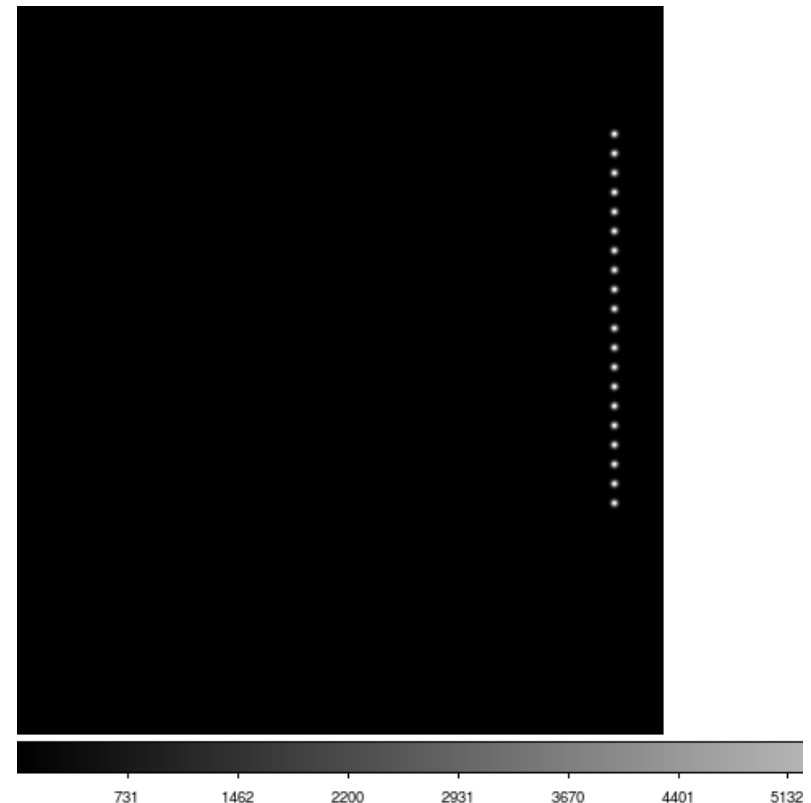
Edge Effect in LSST CCDs

How a charged guard rail affects the image.
Discrepancies between lab and Phosim data.

Max Duncan – Duke University

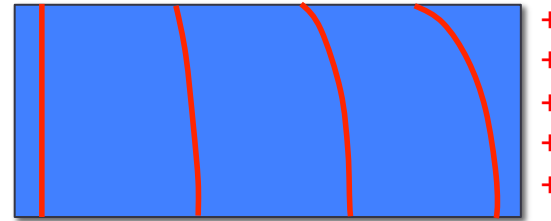
Experiment Details/Intro

- Using Phosim
- Columns of 20 stars plotted:
- Distance measured from center of chip in pixels
- Edge ~2000 pixels
- Stars separated by 12 pixels
- All effects are switched off except for edge effect

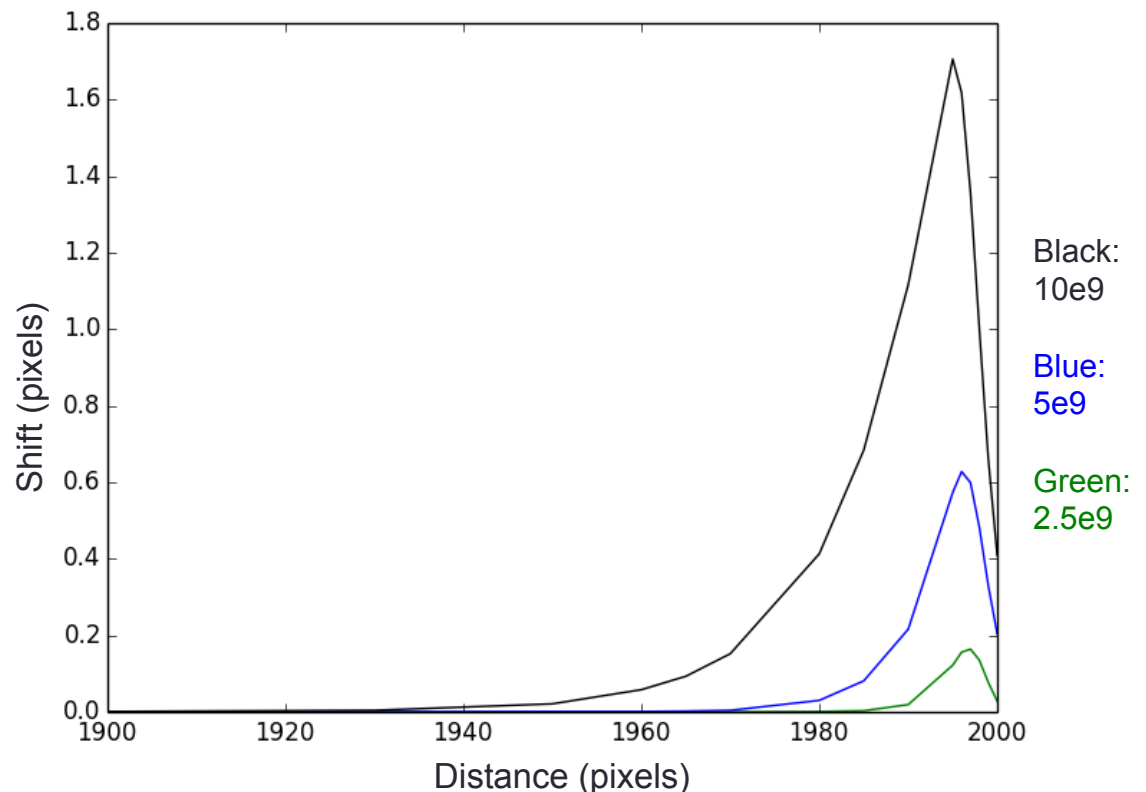


Changing Guard Rail Charge

- Unsurprisingly, increasing charge increases maximum shift and effective distance.
- Charge measured in number of electrons.
- Negative input gives positive guard rail charge.



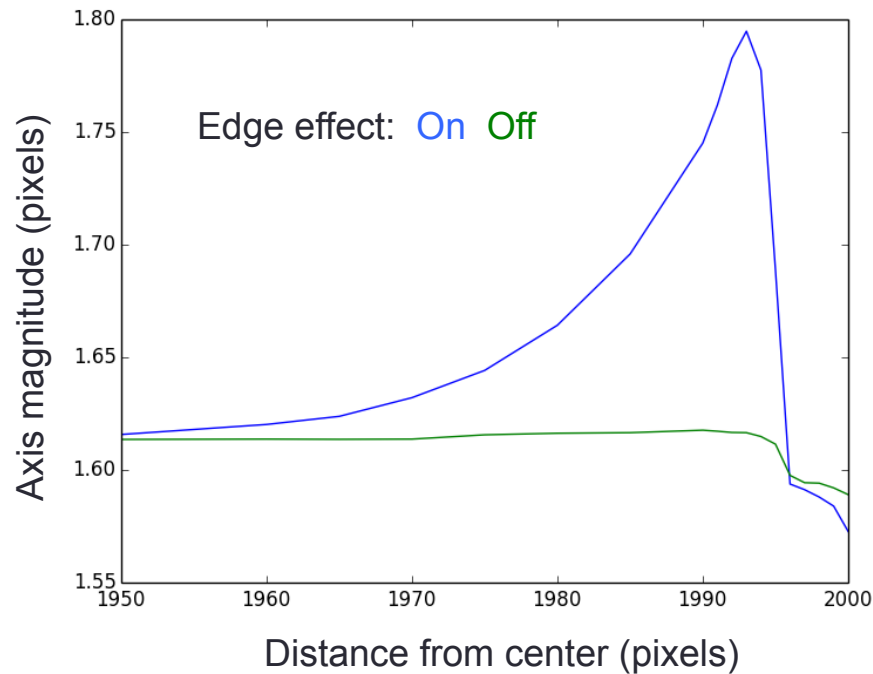
Maximum Shift vs. Distance From Center



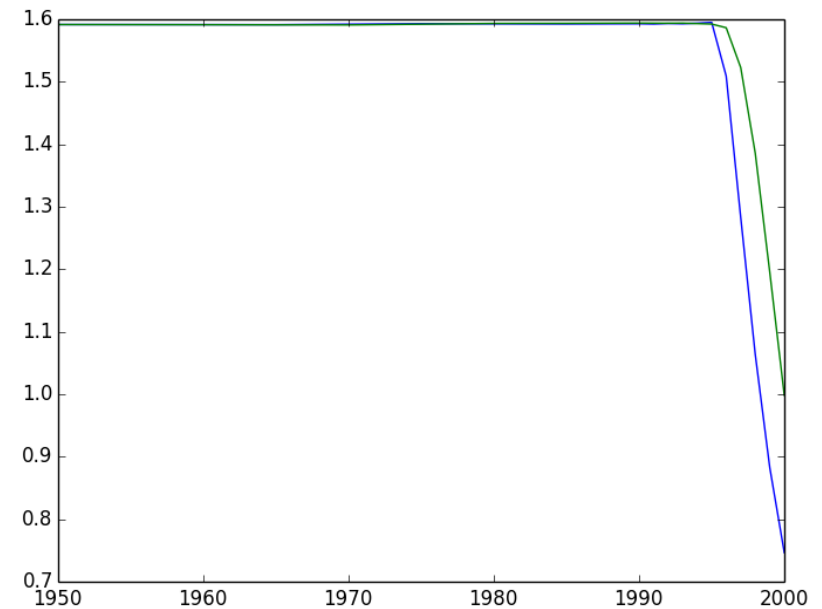
SemiMajor/Minor Axes vs Distance to Edge



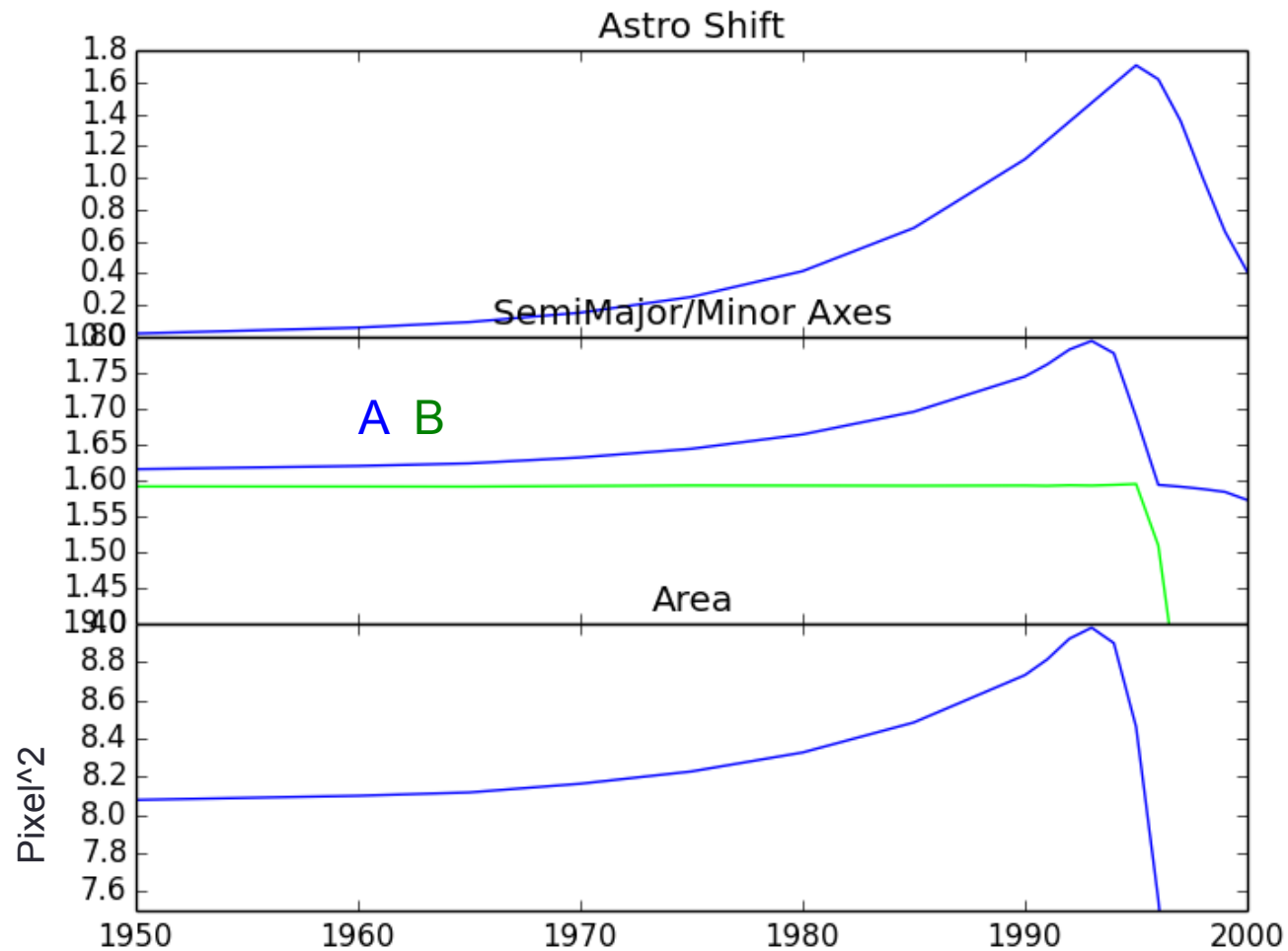
A:



B:

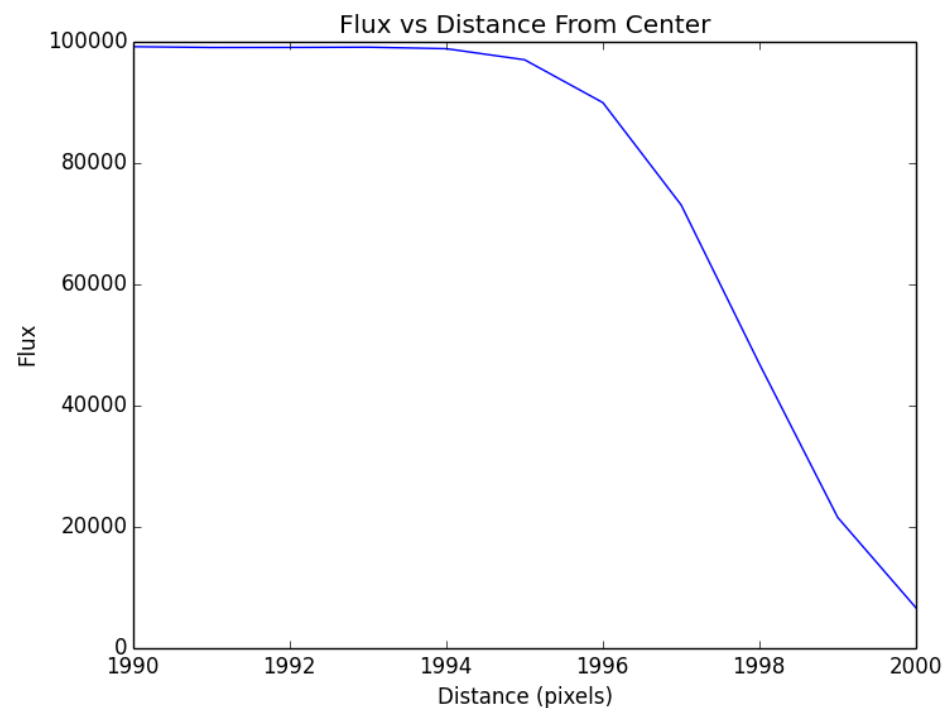
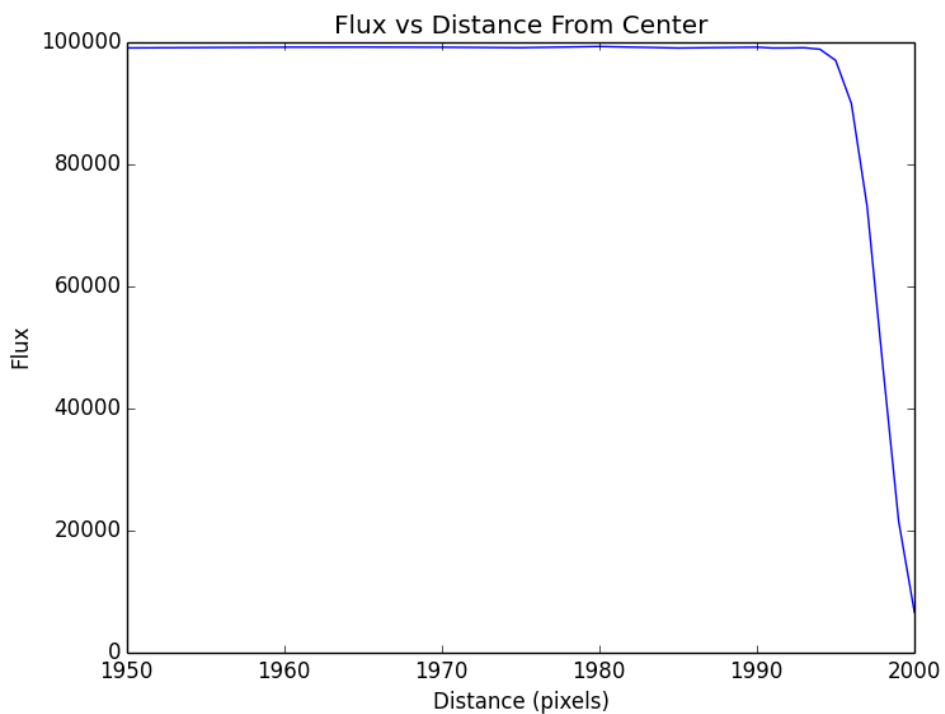
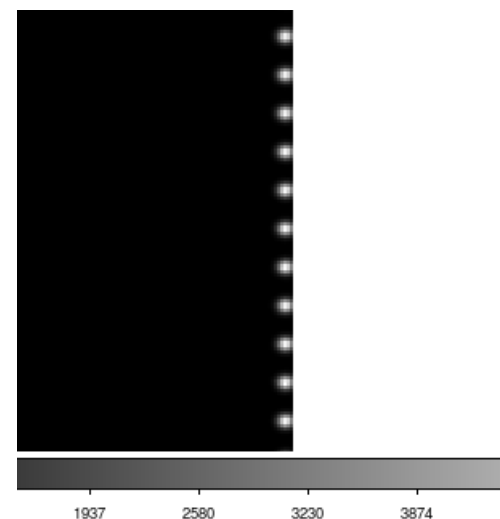


$$\text{Area} = A * B * \pi$$



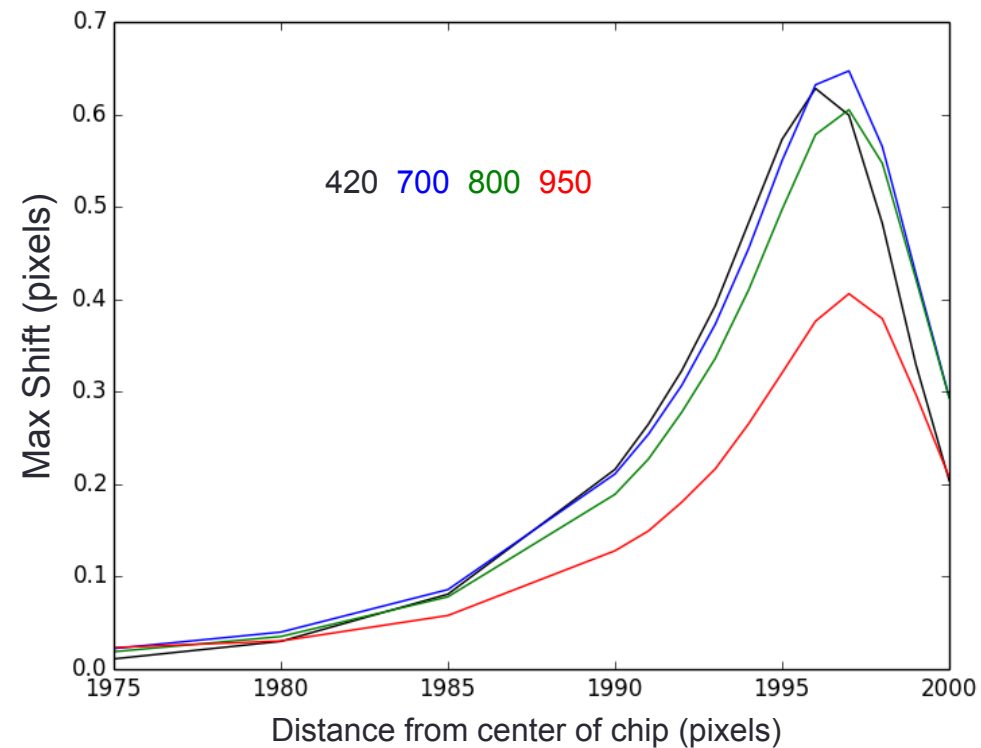
Flux vs Distance

1996:

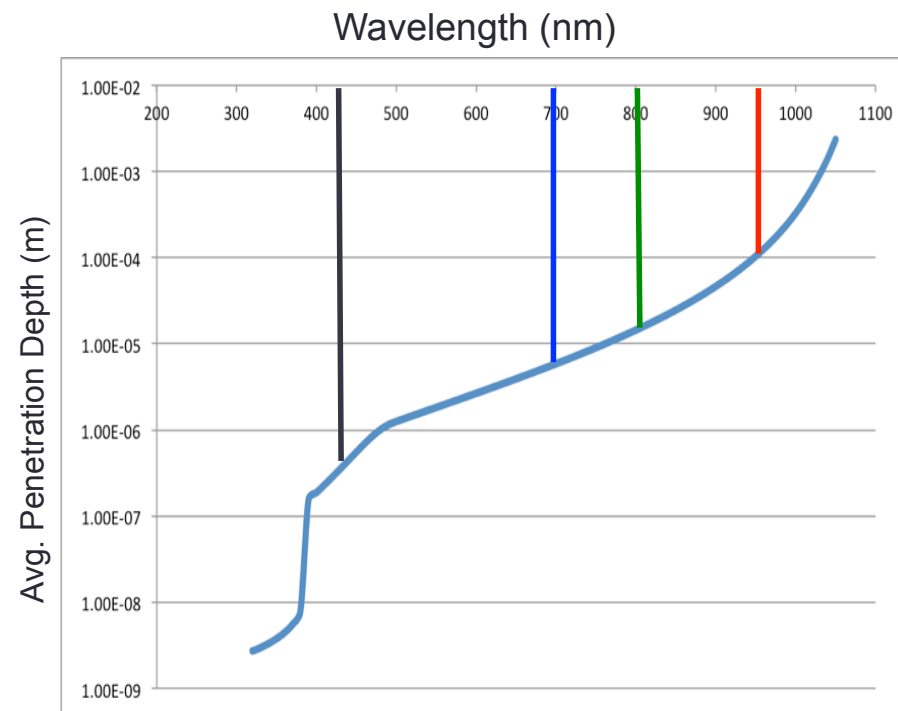


Color Dependence

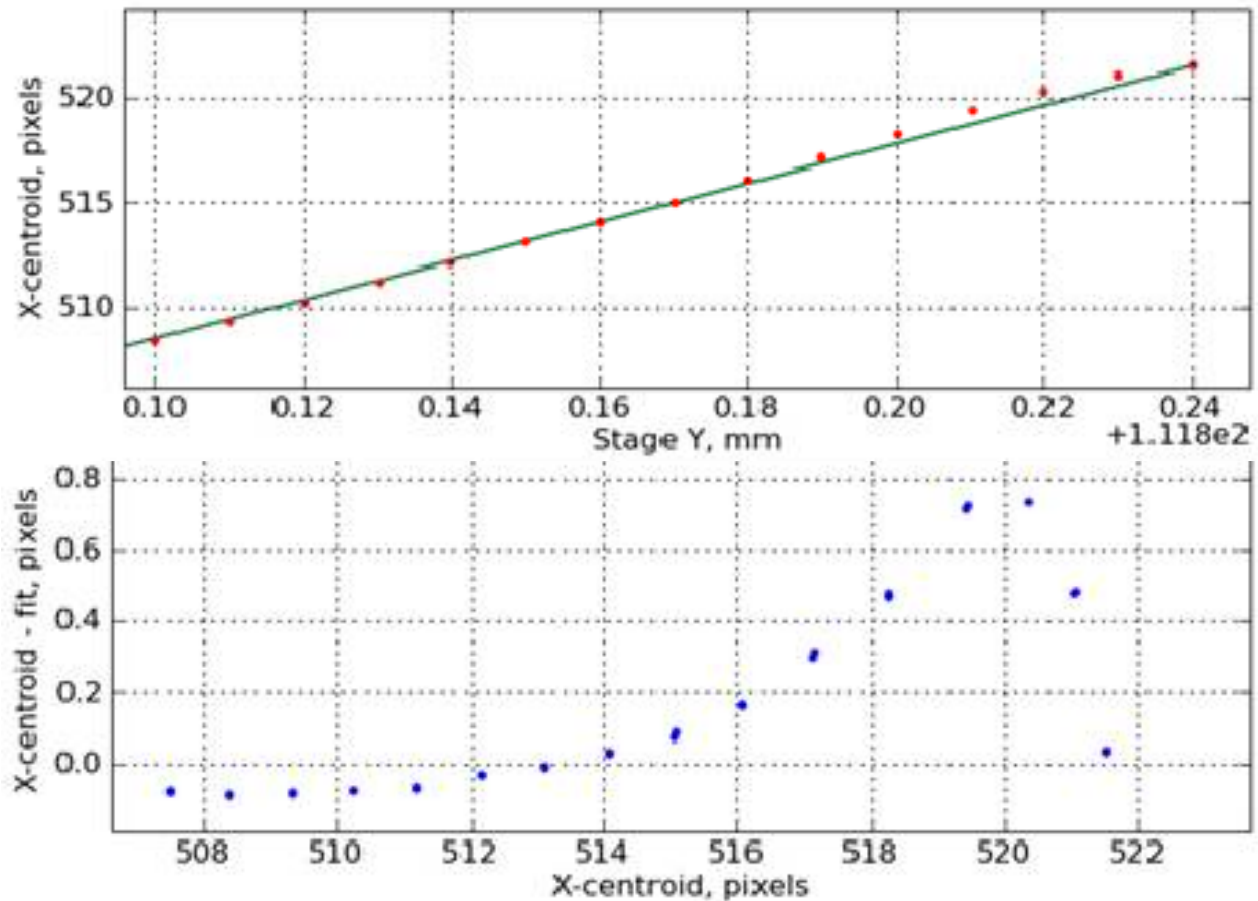
Astrometric Shift (charge of $5e9$):



Avg. penetration depth:



Lab Results

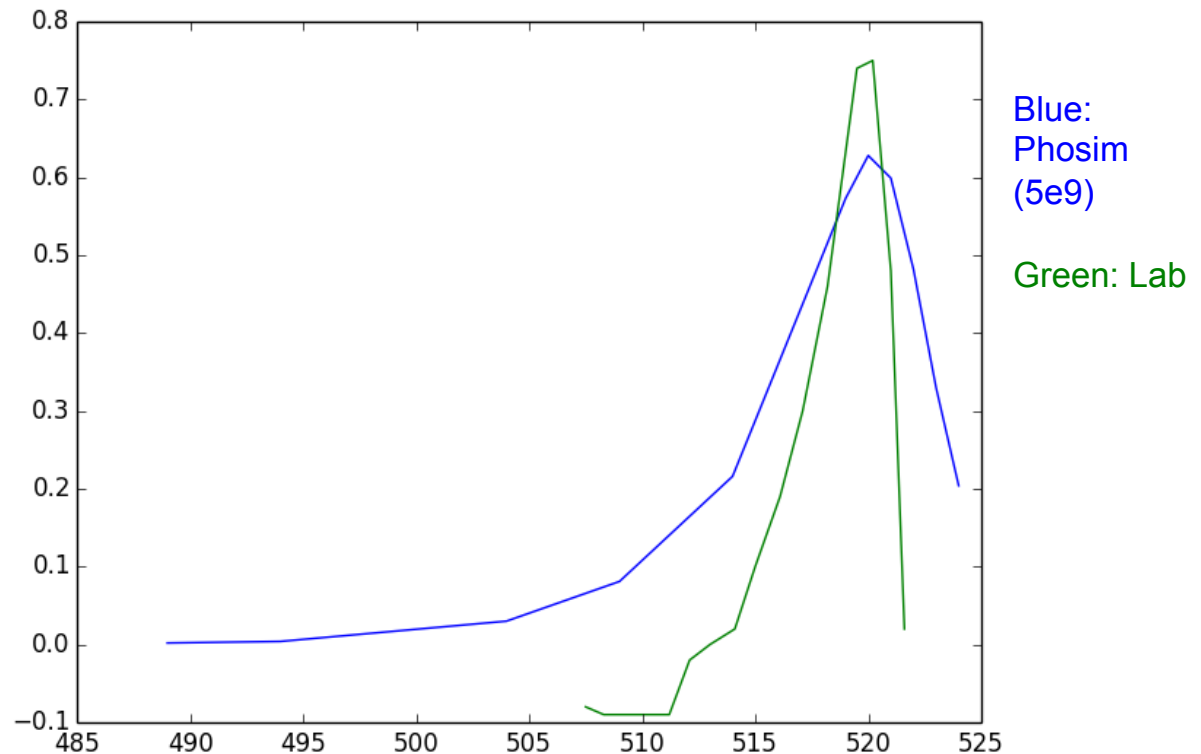


- Curve similar to that in Phosim (previous slide)

Lab Data: O'Connor

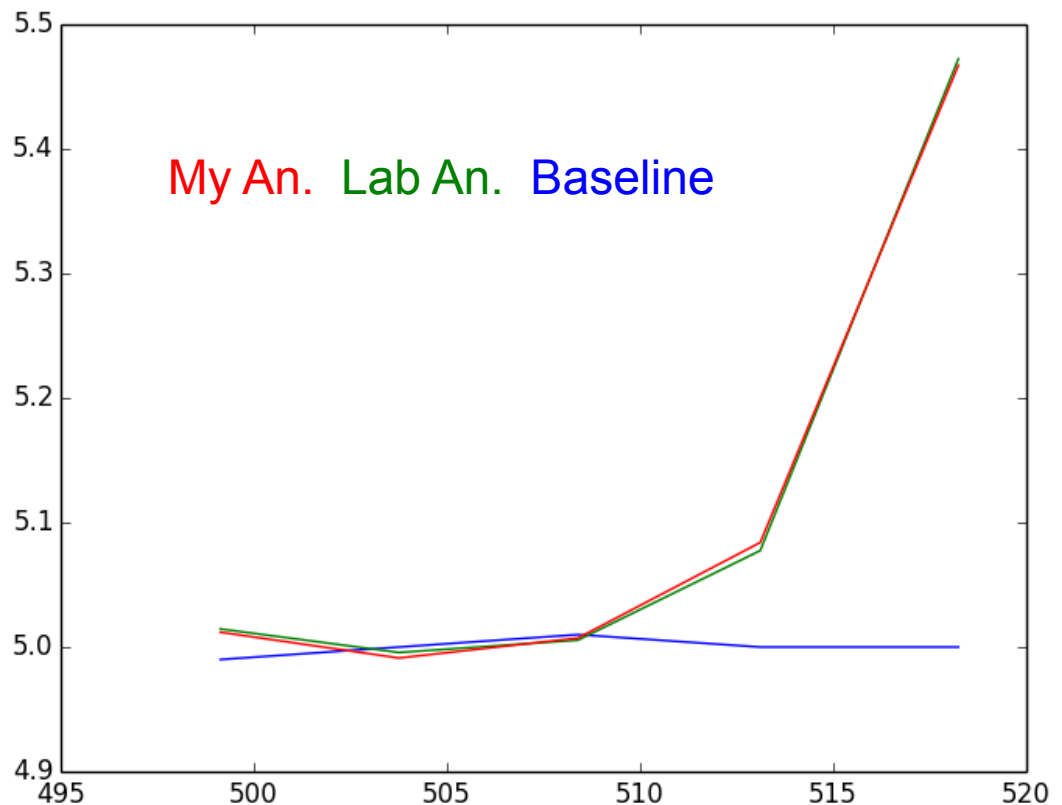
Lab Results vs. Phosim Results

- Differences?
- Lab data far more narrow and steep
- May have different charge
- Guard rail may be shaped differently



Lab Analysis vs. My Analysis

- Astrometric Shift
- Compiled 30 minutes ago
- Lab Analysis style \approx My style
 - Green and red lines almost match perfectly



Conclusion

- Within 50 pixels of edge, significant effect
- Discrepancies exist between lab data
- Next step:
 - Compare further with lab data
 - Conduct a write-up of all findings of summer